

REMARKS

Introduction and status of the claims

- Claims 21, 22, 27, 28, 30, 32, 34, and 42-50 are now pending in this application.
- Claims 21, 27, 42, and 43 have been amended.
- Claims 23 and 26 have been canceled without prejudice or disclaimer of subject matter; in fact, their recitations have been incorporated into claim 21.
- Claims 21 and 50 are in independent form.

Comment on the claim amendments

As noted above, the recitations of claims 23 and 26 have been incorporated into claim 21. Since the features of amended claim 21 were previously recited in claims 23 and 26, Applicants understand that no new issues are being raised herein that would require further consideration and/or search. Accordingly, it is believed that this Amendment After Final Rejection should properly be entered, without requiring Applicants to file a Request For Continued Examination (RCE).

The rejections under 35 U.S.C. § 103(a)

Claims 21, 22, and 50 were rejected under 35 U.S.C. § 103(a) as being unpatentable over GB 2155194 A to Bennion et al. in view of EP 0273703 A2 to Elchelberger et al., and further in view of "Two-photon polymerization initiators for three-dimensional optical data storage and microfabrication" by Cumpston et al.

Claims 23, 26, 27, 30, 32 and 42 were rejected under 35 U.S.C. § 103(a) as being unpatentable over GB 2155194 A to Bennion et al. in view of EP 0273703 A2 to Elchelberger et al., further in view of "Two-photon polymerization initiators for three-dimensional optical data storage and microfabrication" by Cumpston, et al., and further in view of U. S. Patent Application Publication No. US 2004/0001661 A1 to Iwaki et al.

Claim 28 was rejected under 35 U.S.C. § 103(a) as being unpatentable over GB 2155194 A to Bennion et al. in view of EP 0273703 A2 to Elchelberger et al., further in view of "Two-photon polymerization initiators for three-dimensional optical data storage and microfabrication" by Cumpston, et al., and further in view of U. S. Patent No. 6,684,007 B2 to Yoshimura et al.

Claim 34 was rejected under 35 U.S.C. § 103(a) as being unpatentable over GB 2155194 A to Bennion et al. in view of EP 0273703 A2 to Elchelberger et al., further in view of "Two-photon polymerization initiators for three-dimensional optical data storage and microfabrication" by Cumpston et al., and further in view of U. S. Patent No. 5,255,070 to Pollak et al.

Applicants have carefully considered the Examiner's comments as set out in the Office Action, as well as the cited references, and submit that independent claims 21 and 50, together with the claims dependent therefrom, are patentably distinct from the cited references for at least the following reasons.

In the Office Action the Examiner raises an obviousness rejection based on Bennion et al. (GB 2,155,194 A), Elchelberger et al., (EP 0 273 703 A2) and Cumpston et al.

With regard to Bennion et al., the Examiner acknowledges the novelty of the claimed feature of embedding the optoelectronic component in the optical layer, as defined in claim 21. However, according to the Examiner, it would have been obvious to a person skilled in the art to modify the method of Bennion et al. to arrive at the claimed subject-matter, as Bennion et al. teaches the spin coating of optical material between semiconductor laser 10 and modulator 12. Applicants submit, however, that this reasoning is based on impermissible hindsight (MPEP 2142: "...impermissible hindsight must be avoided..."). Applicants note, first, that Bennion et al. contains no hint whatsoever which would direct a person skilled in the art to attempt such modification.

Furthermore, a person skilled in the art would be strongly prejudiced against fully

embedding the components in the construction of Bennion et al. As noted previously, Bennion requires a separate container or envelope to hermetically and opaquely seal the device. The reason for this is that the prior art relies upon the - reversible - conversion of a photochromic material from an uncolored state to a colored state. Any exposure of the optical material to light would reverse the conversion process and render a malfunctioning device. Thus, the separate container or envelope cannot be dispensed with using the technology of Bennion. Therefore, in case a person skilled in the art would - theoretically - take into consideration substituting the opaque container or envelope with additional optical material embedding the components in the manner of the invention, he or she would be strongly prejudiced against such undertaking. Thus, Bennion et al. would not present a promising starting point for a modification that could result in the claimed subject matter. Moreover, the limitations of the claimed subject matter, which, even if disclosed separately in the prior art, could not be combined to arrive at the claimed invention without resorting to knowledge of the invention or non-obvious modifications.

In any case, the subject matter of amended claim 21 is further distinguished from Bennion et al. by claiming a printed circuit board layer with a connective inner ply and/or outer ply upon production of the optical waveguide structure, whereupon electrically conductive connections to the optoelectronic components are established through via connections.

This amendment highlights the purpose of embedding the optoelectronic components within the optical material. According to the claimed invention, the optoelectronic components are protected in the optical material, which surrounds the optoelectronic components to establish via connections extending across the optical material.

On the other hand, Bennion et al. could not be modified to provide for such printed circuit board layer and via connections therethrough, as it requires an opaque and hermetical sealing envelope surrounding the optical material. Thus, it cannot be obvious to modify the device of Bennion by adding a printed circuit board layer and via connections to connect the

optoelectronic components, even if such layers and connections are *per se* known in the art (cf. e.g. Iwaki et al.). According to the invention, an irreversible two photon absorption process is used for structuring the waveguide between the optoelectronic components. Thus, the TPA structuring of the waveguide - in contrast to the photochromic material of Bennion et al. - allows to dispense with the hermetical and opaque sealing of the device required by Bennion, which is a prerequisite for arranging a printed circuit board layer and via connections on top of the optoelectronic components. Further advantages of the present invention have been discussed previously.

For at least the foregoing reasons, claim 21 is seen to be clearly allowable over the cited references.

Independent claim 50 recites certain features which are similar in many relevant respects to those discussed above in connection with claim 1. Accordingly, claim 50 is believed to be patentable for at least the same reasons as discussed above in connection with claim 1.

The other claims in this application are each dependent from independent claim 21 discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

Conclusion

In view of the foregoing amendments and remarks, Applicants respectfully request favorable reconsideration and early passage to issue of the present application.

Respectfully submitted,

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